

What is claimed is:

1. A waveguide, including:
a number of hollow core fibers arranged longitudinally around a hollow guide region;
wherein the number of hollow core fibers are arranged as a two dimensional photonic crystal with a photonic bandgap; and
wherein the hollow guide region includes geometry that is shaped to channel a signal frequency that is substantially within the photonic bandgap.
2. The waveguide of claim 1, wherein the hollow core fibers include a round core cross section.
3. The waveguide of claim 1, wherein the hollow core fibers include a round outer surface cross section.
4. The waveguide of claim 1, wherein the number of hollow core fibers are arranged as a two dimensional photonic crystal in a triangular lattice.
5. The waveguide of claim 1, wherein the number of hollow core fibers include silica.
6. An optical signal transmission device, including:
a number of hollow core fibers arranged longitudinally to define a hollow guide region surrounded by the number of hollow core fibers;
wherein the number of hollow core fibers are arranged as a two dimensional photonic crystal with a photonic bandgap; and
wherein the hollow guide region includes geometry that is shaped to channel an

optical light frequency that is substantially within the photonic bandgap.

7. The optical signal transmission device of claim 6, wherein the hollow core fibers include an elliptical core cross section.

8. The optical signal transmission device of claim 6, wherein the hollow core fibers include a polygonal outer surface cross section.

9. The optical signal transmission device of claim 6, wherein the number of hollow core fibers are arranged as a two dimensional photonic crystal in a triangular lattice.

10. The optical signal transmission device of claim 6, wherein the number of hollow core fibers include silica.

11. A signal transmission system, including:

a signal generating source;

an optical coupler;

a waveguide, including:

a number of hollow core fibers arranged longitudinally to define a hollow guide region enclosed by the number of hollow core fibers;

wherein the number of hollow core fibers are arranged as a two dimensional photonic crystal with a photonic bandgap;

wherein the hollow guide region includes geometry that is shaped to channel a signal frequency that is substantially within the photonic bandgap; and

a photodetector.

12. The signal transmission system of claim 11, wherein the signal generator includes a laser source.

13. The signal transmission system of claim 11, wherein the signal generator includes a light emitting diode.

14. The signal transmission system of claim 11, wherein the hollow guide region geometry is defined by a space of one missing fiber within a lattice pattern of the number of hollow core fibers.

15. A waveguide, including:

a number of hollow core fibers arranged longitudinally to define a hollow guide region;

wherein the number of hollow core fibers are arranged as a two dimensional wave channeling means; and

wherein the hollow guide region includes geometry that is shaped to channel a signal frequency that is substantially contained within the channeling means.

16. The waveguide of claim 15 wherein the hollow guide region is located at central axis of number of waveguide.

17. The waveguide of claim 15 wherein the hollow guide region geometry is defined by a space of one missing fiber within a lattice pattern of the number of hollow core fibers.

18. The waveguide of claim 15 wherein the number of hollow core fibers are arranged with a filling factor of 55 percent.

19. A waveguide, including:
a number of hollow tube shaped fibers arranged longitudinally around a hollow guide region;
wherein the number of hollow tube shaped fibers are arranged as a two dimensional photonic crystal with a photonic bandgap; and
wherein the hollow guide region includes geometry that is shaped to channel a signal frequency that is substantially within the photonic bandgap.
20. The waveguide of claim 19, wherein the number of hollow tube shaped fibers are arranged with a filling factor of greater than about 50 percent.
21. The waveguide of claim 19, wherein the number of hollow tube shaped fibers are arranged as a two dimensional photonic crystal in a triangular lattice.
22. The waveguide of claim 19, wherein the hollow guide region has an effective diameter between about 0.5 and about 5 microns.